



УТВЕРЖДАЮ
Заведующий кафедрой
молекулярной и клеточной биологии
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«31» августа 2023 г

СПИСОК ВОПРОСОВ ДЛЯ ПОДГОТОВКИ К ЗАЧЕТУ
дисциплины «МОЛЕКУЛЯРНАЯ ГЕНЕТИКА»
для студентов 2 курса Лечебного факультета
Билингвальная программа
III-IV семестр 2023-2024 учебного года

1. The subject and tasks of molecular genetics
2. Nuclear and cytoplasmic heredity. Concepts, sources, features.
3. The range of application of molecular genetic methods in medicine.
4. Organization of a modern genetic laboratory.
5. The possibilities of using molecular genetic research methods.
6. Structure and functions of DNA.
7. Structure, types and functions of RNA. Comparative characteristics of DNA and RNA.
8. DNA replication. Principles, stages, enzymes.
9. DNA repair. Causes of DNA damage, repair systems, consequences of violation of repair processes.
10. Methods of DNA and RNA isolation. Principles of implementation and detection of PCR results.
11. Eukaryotic chromatin compactification levels. Features of the organization of chromosomal material of viruses, prokaryotes and eukaryotic cell organelles.
12. Structural components and morphological types of metaphase chromosomes.
13. Characteristics of chromosomal mutations: essence, causes, effects.
14. Characteristics of genomic mutations: essence, causes, effects.
15. Cytogenetic research methods: characteristics, possibilities, limitations.
16. Comparative characteristics of the structural organization of pro- and eukaryotic genes.
17. Classification of genes. Characteristics of gene varieties.
18. Directions of evolution of the genomes of pro- and eukaryotes.
19. Methods of accounting for the results of genotyping.
20. Tasks of structural genomics, functional, comparative, medical and evolutionary genomics.
21. Transcription. Stages, factors, regulation of transcription.
22. Broadcast. Properties of the genetic code. Stages, factors, regulation of translation.
23. Post-transcriptional and post-translational modifications.
24. Epigenetic mechanisms of regulation of eukaryotic gene expression.
25. Characteristics of the main methods for assessing gene expression.
26. What is the reason for the discrepancy between the number of genes encoding protein and the number of proteins that are synthesized in human cells?
27. What is single-nucleotide polymorphism and how is it related to diseases?
28. What is the significance of human genome sequencing for practical medicine?

29. What is a bibliographic database?
 30. The main tasks of the Ensembl database.
 31. The concept of metagenomics, metagenome and metabarcoding.
 32. Modern concepts of metagenomics. The main types of research, their advantages and disadvantages.
 33. Nutrigenomics as a new field of genomics. The relationship of genetic variability with the peculiarities of the diet and their impact on human health.
 34. The role of genetic changes and individual reactions in the context of identifying the relationship of nutrients with gene expression.
 35. Nutrigenomic studies and identification of genes responsible for metabolic processes. Identification of risk factors to prevent the negative impact of environmental factors on the implementation of genetically determined reactions.
 36. General patterns of genetic regulation of individual development.
 37. Homeosis genes and the body structure plan. Genomic imprinting.
 38. Differential activity of genes is the basis of cellular determination and differentiation. Regulation of gene activity. Levels of regulation.
 39. Molecular genetic foundations of sex determination.
 40. Genetic foundations of aging processes.
 41. Give the classification of hereditary pathology of a person.
 42. What are multifactorial diseases? Give examples. What methods can be used to study these diseases?
 43. What are the main patterns of distribution of hereditary diseases and MFZ in populations and families.
 44. The subject and tasks of ecological genetics.
 45. Briefly describe the mechanisms of ecogenetic interactions.
 46. General characteristics of the main stages and tools of molecular gene cloning.
 47. Gene therapy. Principles and approaches. Examples of developed and applied gene therapy.
 48. Vector and subunit vaccines. Principles of obtaining. Advantages and disadvantages.
 49. Stem cells. Classifications based on development potential. Characteristic features.
 50. Principles of obtaining induced stem cells and prospects for their use in medicine.
 51. How can a limited number of genes encode antibodies and receptors for a huge number of antigens?
 52. What are somatic mutations and how can they promote or hinder the immune response?
 53. What is the difference between benign and malignant tumors?
 54. Compare the concepts of "hereditary cancer" and "hereditary predisposition to cancer".
 55. How can chromosomal mutations cause the development of a tumor?
 56. Molecular genetic research methods. PCR. General characteristics of the method. The main types of PCR.
 57. Methods of genome and exome research. Problems and approaches in the interpretation of sequencing results.
 58. New generation sequencing methods. NGS.
 59. Medicine 4P. Characteristic features.
 60. Genetic safety. Modern ideas and main discussions.
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